DOCUMENT RESUME

ED 210 780 EA 014 254

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TITLE Learning Time and Educational Effectiveness.
INSTITUTION National Association of Secondary School Principals, Reston, Va.
PUB DATE Dec 80
NOTE 14p.
AVAILABLE FROM National Association of Secondary School Principals, 1904 Association Dr., Reston, VA 22091 ($.50 per copy, quantity discounts; payment must accompany orders of $10.00 or less).
JOURNAL CIT Curriculum Report; v10 n2 Dec 1980

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Academic Achievement; Curriculum Development; Elementary Secondary Education; Mastery Learning; Needs Assessment; Performance; School Districts; Student Characteristics; Teacher Effectiveness; *Time Factors (Learning); *Time on Task
IDENTIFIERS Allocated Learning Time; Direct Instruction

ABSTRACT

To explore the relationship between time and school learning, this paper defines the three kinds of learning time identified by researchers--allocated time, time-on-task, and academic learning time--and relates them to curriculum development. The author cites evidence that time-on-task is related to student achievement and describes two instructional approaches that have been associated with high levels of time-on-task. The first of these is mastery learning, which includes nine key elements, summarized here in checklist form. The second, direct instruction, has ten key elements and, according to the author, is similar to mastery learning. Central to both is the need for clearly defined goals, communication of expectations to students, and careful monitoring of student progress. The author lists several school districts currently involved in putting the research on learning time and instruction into practice and includes a capsule description of each program. Finally, implications of the learning time concept for instructional and teaching effectiveness are offered. (Author/WD)

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Research/Ideas/Practice
CURRICULUM REPORT

(ISSN 0547-4205)

Vol. 10 No. 2 December 1980

ED210780

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The Importance of Learning Time in Schools

What relationship does time have to school learning? How important is the amount of study time to learning effectiveness?

Both researchers and practitioners in the past decade have developed an increasing interest in the relationship between the two. Their interest stems from several sources. Some educators contend that getting students to spend most of their time in appropriate learning activities is the primary goal of the typical classroom teacher. If a student's time in the classroom is not spent trying to learn, it will be spent on other things, often to the dismay of the teacher and/or to the detriment of the class.

Other educators (Carroll, 1963) suggest that learning is dependent on how much time students actually spend learning. Learning time is thought of as a cause of achievement. Still other educators (Bloom, 1974) see the time spent in learning as the "missing link" between instruction and achievement. Instruction can have a profound effect (either positive or negative) on student learning time which, in turn, can profoundly affect achievement. Learning time in this view helps to explain the variations in student achievement based on instructional differences.

Educators interested in curriculum design have expressed much interest in learning time. The school day only has so much learning time available, six hours per day, 180 days per year. Although this amount of time has remained remarkably stable over the past century, the amount of material covered and what students are expected to assimilate has increased dramatically. Since learning almost anything significant would seem to require a certain amount of time, the introduction of a bulk of new material into the same time frame would reasonably be expected to have negative effects on the quality of learning. The amount of available learning time, then, does influence the curriculum, forcing educators to establish priorities and determine emphases.

Educational researchers have also come to view time as a potentially confounding variable in classroom research studies. If, for example, a study is designed to compare the effectiveness of an "individualized" approach to instruction with the proverbial "traditional" approach, the emphasis of the study is on the type of instructional approach. Suppose, however, that students spend twice as much time working on a particular topic (e.g., differentiating fact from opinion) and that the achievement test used to measure effectiveness tends to emphasize that topic. Such a difference in quantity will probably be sufficient to outweigh any real differences in quality of instruction.

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The Nature of Learning Time

Educational researchers have identified three distinct types of learning time: 1) allocated time, 2) engaged time or time-on-task, and 3) academic learning time.

- Allocated time refers to the amount of time that students are scheduled for a subject or learning activity. Allocated time is the time in the classroom during which students have an opportunity to learn some material or to attain some goal. Indeed, the variable, "opportunity to learn," has received attention in several large-scale international studies of achievement with quite promising results.

- Students do not spend all of the allocated time actually studying the subject or completing the assigned learning activities. The amount of time students actually are attempting to learn is termed engaged time or time-on-task (TOT). Task, here, refers to a learning goal and its appropriate learning activities. The time students are not involved in learning is called time-off-task.

- Researchers at the Far West Laboratory for Educational Research and Development (Fisher et al., 1978) have identified a third type of learning time that they call academic learning time (ALT). Academic learning time refers to the amount of time students are engaged in, and experiencing success in, learning.

  Success is an elusive and complex concept. In view of Far West Lab researchers, success is more likely when learning goals and goal-related activities are at appropriate levels of difficulty for students. Thus, academic learning time encompasses on-task student behaviors which are relevant to the attainment of a learning goal that is at an appropriate level of difficulty.

Because all three types affect student learning, we will discuss the implications of each. The most frequently studied, however, is time-on-task. The bulk of this research has been conducted in the primary and middle school grades. Only recently have studies been initiated at the high school level. The results of these few high school studies, nonetheless, are remarkably consistent with those at the elementary and middle school levels.

Allocated Time and Curricular Priorities

Allocated time is classroom time during which students have an opportunity to learn some subject matter or particular concepts, principles, and/or skills within that subject matter. If mathematics, for example, is taught five days a week, for 50 minutes a day, students have approximately 165 hours in the school year during which they would have an opportunity to learn mathematics. Similarly, if the concept of democracy is taught for six days (50 minutes per day) during the entire school year, students would have only five hours allocated for learning about democracy.

Despite state and local recommendations or mandates about the amount of time that should/must be devoted to various subject areas, researchers have found large differences in the time actually allocated to subject areas and to specific content or topics within subject areas. The average amount of time allocated to reading and reading-related instruction in fifth grade, for example, varies from about 60 minutes per day in some classes to about 140 minutes in others. If a school year of 180 days is considered, students in the 140-minute group would have an astonishing 240 hours of additional instructional time in reading available each year.

Differences in allocated time are quite large and are related to differences in student achievement. An additional 240 hours of instruction in reading, regardless of the quality of that instruction, should result in the acquisition of a greater number of reading skills. While these differences were found at the elementary and middle school levels it is quite likely that such differences also occur in junior and senior high school programs. Some secondary mathematics teachers, for example, tend to allocate a great deal of time to the solution of word problems; others tend to neglect the topic altogether.

The implications of these findings for curriculum priorities seem clear. Priorities must be established, and they should be based on the importance of the goals, subjects, and/or topical areas. Importance, in turn, should determine the amount of time allocated to the subject/topic.

Academic Learning Time and Task Difficulty

Academic learning time (ALT) is defined in terms of time-on-task and task difficulty. ALT presumes that students are involved in learning tasks which are at an appropriate level of difficulty. The concept of "appropriate level of difficulty" may be approached from two promising perspectives. The first (implied by the Far West Lab research) is to select relatively easy tasks; that is, goals and goal-related activities that are appropriate for the present status of the students and which provide many opportunities for early and frequent success. The second approach, recommended by proponents of "mastery learning" (described in some detail in a later section) is to order tasks in sequence from less complex to more complex, from more concrete to more abstract, and then require students to "master" each task prior to beginning subsequent work.

The Far West Lab approach would likely begin with an assessment of student needs, followed by the selection of tasks which differ only slightly in difficulty from the students' present level of functioning. The "mastery learning" approach would probably begin with an analysis of overall curricular goals. Then subgoals (or objectives) would be identified to build a "bridge" between the overall goals and the current functional level of the students. Individual students would be placed at the appropriate place in the sequence through the use of a placement test or other assessment device. Whereas the first approach may yield many different curricula (i.e., one for each type of student), the second yields only a single curriculum (for each subject area).

Whichever approach is preferred, students must be provided with tasks at appropriate levels of difficulty if a large amount of the allocated time is to be spent on-task. When tasks are at a level of difficulty that promotes success, students tend to spend most of their time engaged in learning.

Learning Time and Achievement

Evidence from a number of research studies suggests that time-on-task is related to achievement. The more time students spend on-task, the more they learn. The relationship tends to be stronger in: 1) studies of shorter duration, 2) studies in which a sufficient number of observations are made (to allow for reliability of observation), and 3) studies in which the goals and topics assessed by the achievement tests (so-called criterion-referenced tests) are quite similar to those included in the curriculum.

A smaller amount of evidence suggests that this relationship is causal in nature. Studies by Anderson (1976) and Walker and Hope (1976) indicate that as time-on-task is increased, so is achievement. The techniques used to increase time-on-task varied in these two studies and will be discussed later. Evidence also exists that greater amounts of allocated time and academic learning time are associated with higher achievement.

Student Characteristics and Learning Time

What kinds of students tend to spend more of their time on-task?

Students who are higher in verbal and quantitative ability spend more of their time on-task and tend to be more consistent in their time use than their low ability counterparts. Studies conducted at the junior high school level, for example, suggest that high verbal ability students spend about the same proportion of their time on-task (approximately 80 percent) over the entire class period.

In contrast, students with moderate verbal ability spend a decreasing proportion of their time on-task over the class period. Moreover, the on-task pattern for low verbal ability students is virtually random. One can liken the experience of low verbal ability students in the classroom to a person watching a television set whose picture is interrupted periodically by "interference." It is hard to imagine that much meaningful learning would result from such an experience.

An interesting finding is that high verbal ability students are inclined to spend a particularly high proportion of their time on-task (relative to low ability counterparts) when instruction is presented in a lecture format, or a similar methodology where "one-way" communication (i.e., teacher to student) is prominent (Anderson and Scott, 1978).

Students with more positive affective characteristics (e.g., positive attitudes toward school, interest in particular subject areas, positive self-perceptions of their ability to learn) tend to spend more of their time on-task than students with less positive affective traits. Anderson and Scott found that students with positive self-perceptions in seatwork settings tended to spend especially high proportions of their time on-task in comparison with students of more negative academic self-concept. This finding seems reasonable because seatwork typically calls for a certain amount of self-responsibility on the part of the student. It is likely that students who believe they can learn are more likely to possess a sense of self-responsibility.

Instructional Approaches and Learning Time

If learning time is, in fact, a critical variable influencing student achievement, then the question of what can be done instructionally to increase learning time is an important one. Two instructional approaches have been found to be associated with high levels of time-on-task. An instructional approach here refers to a systematic series of steps that are followed to facilitate student learning. An instructional approach differs from instructional techniques in that the steps involved in the former are more global and more generalized; the latter are more specific and more specialized.

The first approach, mastery learning, is based on a theoretical model proposed by Benjamin Bloom in 1968. The second approach, direct instruction, is the result of a synthesis of classroom research studies (primarily at the elementary level) which have focused on increasing time-on-task as well as achievement.

Mastery Learning

Mastery learning is a philosophy of school learning and a related set of instructional practices. Mastery learning philosophy affirms that virtually all students can learn what schools teach if instruction is approached sensitively, and extra time and help are provided to students when and where they are experiencing difficulty in learning.

Mastery learning instructional programs customarily include nine key elements (Block, 1971):

- ✓ Clearly defined instructional objectives -- explicit statements of what students are to learn;
- ✓ Learning units of approximately two weeks duration that are organized around related sets of objectives;
- ✓ Highly valid, relatively short tests that are used to assess student learning pertinent to the objectives (formative tests);
- ✓ Preset levels of test performance which, when attained, indicate that students have acquired (i.e., "mastered") the underlying objectives;
- ✓ Communication with students about what they are to learn and how they are to learn it;
- ✓ Provision of correctives -- supplementary learning activities and materials for those students failing to attain the present performance standards;
- ✓ Monitoring of corrective activities and materials, and administration of alternate formative tests until virtually all students in the class have met the performance standards;

- ✓ Utilization of cumulative tests for the purpose of assigning grades (summative tests);
- ✓ Assignment of grades from summative test performance based on the preset performance standards, rather than the performance of other students.

The results of experiments on the effectiveness of mastery learning indicate that mastery classes tend to increase in the amount of time on-task over a series of learning units when compared with non-mastery classes. Furthermore, students in mastery learning classes tend to attain consistently higher levels of achievement over the same learning units in comparison with non-mastery students.

Perhaps the most intriguing and most controversial finding of mastery learning research is that students in mastery learning classes tend to require increasingly less allocated time to achieve the same performance level over a series of learning units. As a result, students tend to become more similar both in the amount of learning and the allocated time needed to learn it. The range of differences in the amount of required allocated time decreased from approximately 7 to 1, to 4 to 1 in one study, and from approximately 4 to 1, to 2 to 1 in two others.

Direct Instruction

The second instructional approach associated with high levels of time-on-task is direct instruction. According to Rosenshine (1978), there are approximately 10 key elements of direct instruction:

- Clear goals which are communicated to the students;
- Sufficient time allocated for instruction to ensure a high quality of learning;
- Extensive coverage of content (a large amount of material is presented to the students);
- Strong relationship between goals taught and goals tested;
- Careful ordering and/or sequencing of goals and tasks;
- Teacher control of instructional goals and materials;
- Teacher control of the pace of learning;
- Questions presented to students at a low cognitive level (e.g., encouraging the recall of facts and rules) so that they can produce many correct responses;
- Monitoring of student performance;
- Immediate and academically-oriented feedback to students.

Research (Stalling et al., 1979) both at the elementary and secondary levels clearly supports a relationship between instruction containing these elements and high levels of time-on-task and achievement.

Note the striking similarity of the two instructional approaches. Central to both is the need for clearly defined goals/objectives, communication of expectations to students, and the monitoring of student progress and performance. The major contribution of the mastery learning approach is the use of corrective activities and materials so that errors and misunderstanding are not allowed to accumulate. Direct instruction emphasizes the active role of the teacher not only in determining appropriate goals and activities, but also in the pacing relative to the goals.

Exempli Gratia

Several school districts are currently involved in putting the research on learning time and instruction into practice.

DENVER CITY SCHOOLS, STEDMAN SCHOOL, 2940 Dexter Street, Denver, Colo. 80207
Contact: Carol Barber, Coordinator, Mastery Learning Project

Denver embarked on a mastery learning project four years ago. The major goal of the project is to improve student achievement and attitudes through a staff-development model that emphasizes the principal's role as instructional leader in the school. Principals are trained by a district resource person in the concepts of mastery learning and, in turn, plan staff inservice for their teachers. Inservice presentations revolve around three major themes: Planning for Mastery, Teaching to Mastery, and Classroom Management Techniques. A key objective of the Teaching to Mastery theme is to provide teachers with skills/techniques likely to promote high levels of student time on-task.

Results thus far suggest a significant increase in the use of mastery teaching skills as well as a positive response on the part of teachers to the instructional leadership of principals. Moreover, the project has had a positive impact on student achievement and attitudes and occasioned an increase in time-on-task.

JOHNSON CITY CENTRAL SCHOOL DISTRICT, 666 Reynold Road, Johnson City, N.Y. 13790
Contact: Albert Mamary, Assistant Superintendent for Instruction

In the Johnson City schools, groups of approximately 75 students form a "family" with three to four teachers. These teacher teams are responsible for planning instruction for all students in the "family." Different grade level teachers (e.g., grades 6, 7, and 8) are involved so that students may stay with the team for three years.

Each team first examined its use of time by looking at individual teaching schedules. Most teams found in examining the flow of students among team members and special subjects that much time was wasted. Approximately 20 minutes of instructional time was regained simply by a careful examination of schedules. Time also was regained by having teachers pay special attention to the details of classroom management. Daily schedules were prepared and published. Thus, transition time within and across class activities was decreased dramatically.

Teachers examined their expectations and beliefs both about student learning and the amount of time necessary for students to master various instructional objectives. Initially, teachers publicly stated that all students could learn most of what they were taught, given enough time, yet many teachers had little idea of the actual time needed. The feeling developed that if a student didn't learn something today, she/he would learn it tomorrow or the next day. The present practice is that students are expected to learn within a given time period. This expectation is communicated directly to the students.

Finally, instructional time was saved by the cyclic review of prior learning. Review was built into the instructional process rather than allocated as separate time. Using this approach, teachers found that students maintained their skills better, and the total amount of time spent on review in a semester or entire school year was reduced.

MONTEVIDEO PUBLIC SCHOOLS, 6th Street and Grove Avenue, Montevideo, Minn. 56265
Contact: Candace Tobin, Director, Resource Center

The Montevideo elementary schools use an individualized instructional program developed by the Learning Research and Development Center at the University of Pittsburgh. The program has two major components. The prescriptive component includes activities in reading and mathematics assigned on the basis of diagnostic test results. The exploratory component features a variety of activities selected by students based on their interests--in mathematics, science, social studies, reading, writing, creative arts, perceptual skills, etc.

The program is implemented by means of a Self-Schedule System focusing on student responsibility and decision making. Students can decide when to work on the learning activities prescribed by the teacher in the various prescriptive curricula and when to work on the exploratory learning tasks of their choice. Under the Self-Schedule System, students are given the opportunity to make decisions about when they will do what, but some parts of the "what" are prescribed by the teacher.

The results have been quite positive. Student contacts with teachers are increasingly more instructional rather than managerial in nature. Students are spending a high proportion of their time on-task and achieve mastery of a large number of learning tasks. Moreover, students tend to achieve higher scores on a measure of self-responsibility.

PHILADELPHIA PUBLIC SCHOOLS, 21st and the Parkway, Philadelphia, Pa. 19103
Contact: Earline Sloan, Achieving Schools Expectations Project, Board of Education

The Achieving Schools Expectations Project operates on the belief that for the vast majority of students in a school to achieve on grade level, the entire school must reflect that expectation--principal, teachers, policies, priorities, decisions, and the allocation of resources. Next to people, the most precious, nonrenewable resource of a school is time. Its allocation clearly tells teachers and students what is important at that school and directly contributes to the self-fulfilling nature of the school's expectations.

Entire school staffs, as well as individual teachers, are helped to examine and adjust their use of time in the following areas:

- Scheduled time-off-tasks. Counting start-up time in the morning, time for cycling for special classes, and the like, one school actually had 44 percent scheduled time-off-task. This figure translated to two days every week during which no teaching or learning was occurring. Awareness of the problem led to change and more efficient operation.

- Teacher attitudes toward difficult teaching times. Staffs are helped to recognize that any attitude which allows a teacher to waste time regularly (e.g., "You can't teach on Friday afternoon." "You can't teach the day before a holiday, during June, etc.") is unhelpful, unproductive, and simply unacceptable. On May 1, teachers were informed that 20 percent of the total time available for teaching during the school year still remained.

- Planning for total time. Another way to think about teaching time and making time important is to have teachers carefully plot what they should teach during the course of a year--the minimum number of things students have to learn in a year to make a year's progress. In high expectation circumstances, instructors teach more and students learn more in the same amount of time. With careful curriculum planning by classroom teachers, principals and resource teachers can monitor learning and instruction more effectively so that no major program omissions can occur. Of course, this process must be coupled with the understanding that all students must be helped to learn rather than just a few.

PONTIAC CITY SCHOOLS, 44 State Street, Pontiac, Mich. 48053
Contact: Helen Efthim, School Learning Climate Program

In Pontiac, Mich., student team learning is being studied for its impact of time-on-task. Observers of several high school mathematics classes were struck by the high levels of time-on-task of the most reluctant 9th grade general math students when the "teams" of which they were members were having study or practice sessions prior to game competition. Because so much of the recent research on effective instruction has been conducted in actual classroom settings that do not include team learning, little is known about its relationship with time-on-task. Nonetheless, the anecdotal evidence from the Pontiac schools suggests that further research on the impact of team learning might be profitable.

Team learning is currently being integrated into existing instructional approaches in three Pontiac schools. The learning teams are heterogeneous in ability and racially mixed. The emphasis is on competition among teams in a game-like situation. A formal evaluation is planned with emphasis on time-on-task, achievement, cooperation, and the enjoyment of learning.

SAN DIEGO CITY SCHOOLS, 4100 Normal Street, San Diego, Calif. 92103
Contact: Steven Isaac, Director of Evaluation Services

Faced with a puzzling decline in reading scores, the San Diego schools investigated ways that an academic learning time approach could be implemented. The resulting program provided inservice to principals and their staffs on the major findings and classroom implication of the Far West Laboratory ALT studies. Merely describing the major features and factors contributing to on-task and off-task behaviors was sufficient to reverse the reading score decline.

Encouraged by this success, a more focused stage of implementation was initiated. A magnet program based on Academic Learning Time was established in a school with a large proportion of low achieving minority students. The staff at the Far West Lab provided teacher inservice, and specially trained resource teachers were assigned to ensure the maintenance of high on-task student behavior. Preliminary analysis of achievement test data indicates some promising gains.

VANCE COUNTY SCHOOLS, 128 Church Street, Henderson, N.C. 27536
Contact: Shirley W. Johnson, Assistant Superintendent

The Vance County schools were concerned with the effectiveness of their current Title I intervention program. They decided to initiate a new Title I program based on the time-on-task concept.

Students in the Vance County program spend approximately two and a quarter hours in "time-on-task classrooms." Each classroom is staffed by a teacher and an aide. Approximately 20 percent of the time is devoted to group instruction. Students spend the remaining time at individual work on assignments derived from the group instruction material.

Students earn points for remaining on-task and lose points for being off-task. Points for on-task behavior are awarded on a variable reinforcement schedule. Checkpoints vary between five and 20 minutes and become less frequent as the school year progresses. During the first three weeks, students can exchange their points for tangible rewards such as puzzles, models, games, pencils, and the like. After the third week, points are accumulated and may be exchanged at the end of a fixed time period (e.g., 16 weeks) to participate in a group social activity like bowling or a movie.

Implications of the Learning Time Concept

Perhaps the most obvious characteristic of these exemplary programs is the very diversity of their approach to learning time. Some schools have chosen to develop a large-scale instructional approach such as mastery learning. Some have worked on specific aspects of instruction (e.g., teacher expectations, team learning, reinforcement, cyclic review). Others have focused on increasing student responsibility and decision making. Still others have concentrated on heightening awareness of time-on-task behavior.

This diversity highlights the strength of the learning time concept. Learning time is seen as a key to improving student achievement, but the possibilities for implementation are many. The actual approach will depend on the types of students, the personality characteristics of the teachers, and other "in-school" variables. In all cases, planning to do something about increasing actual learning time is a necessary first step.

The concept of learning time also has implications for the assessment of instructional and teaching effectiveness. Student achievement cannot occur without a sufficient amount of allocated time and on-task time. Thus learning time, especially time-on-task, can serve as an initial indicator of instructional and teaching effectiveness. If an instructional program exhibits consistently low levels of time-on-task, it is quite likely to be ineffective in terms of student achievement or attitude. Similarly, if the methods and strategies employed by a particular teacher in a particular classroom are consistently associated with low levels of time-on-task, those methods and strategies are suspect.

Two points in the previous paragraph bear stressing.

First, the consistency of time-on-task behaviors must be determined if task level is to be used as an indicator of overall effectiveness. Instructional programs usually have strengths and weaknesses that will be highlighted over several observations by an inconsistency in time-on-task levels. Similarly, some teaching techniques and strategies will be effective while others will be ineffective. These differences will show up in time-on-task inconsistencies over several observations.

Second, time-on-task is an indicator of teaching effectiveness not teacher effectiveness. Most teachers do some effective and some ineffective things in their classrooms. The effective techniques and strategies should be enhanced and maintained while the ineffective ones should be eliminated. Time-on-task, then, can provide teachers with information about their strengths and weakness. The result--teaching effectiveness can be improved rather than simply judged.

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This Curriculum Report was prepared by Lorin W. Anderson, College of Education, University of South Carolina at Columbia. Dr. Anderson has worked on mastery learning research with Benjamin Bloom at the University of Chicago. He has published many articles and papers on the relationship of time to school learning.

Curriculum Report is a bi-monthly publication of the National Association of Secondary School Principals, 1904 Association Dr., Reston, Va. 22091. Annual subscription rate of $2 is included in the dues of NASSP. Individual subscriptions are not available. Additional copies may be ordered: single copies, 50¢ each; 2-10 copies, 40¢ each; 11-99 copies, 35¢; 100 or more, 30¢. *Payment must accompany orders of $10 or less.*

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